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TEST PROCEDURES FOR QUALIFYING WAXES
FOR USE IN EXPLOSIVES

Elton Y. McGann, et al

Naval Weapons Station
Yorktown, Virginia

16 September 1974

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NAVAL WEAPONS STATION, YORKTOWN, VIRGINIA 23491



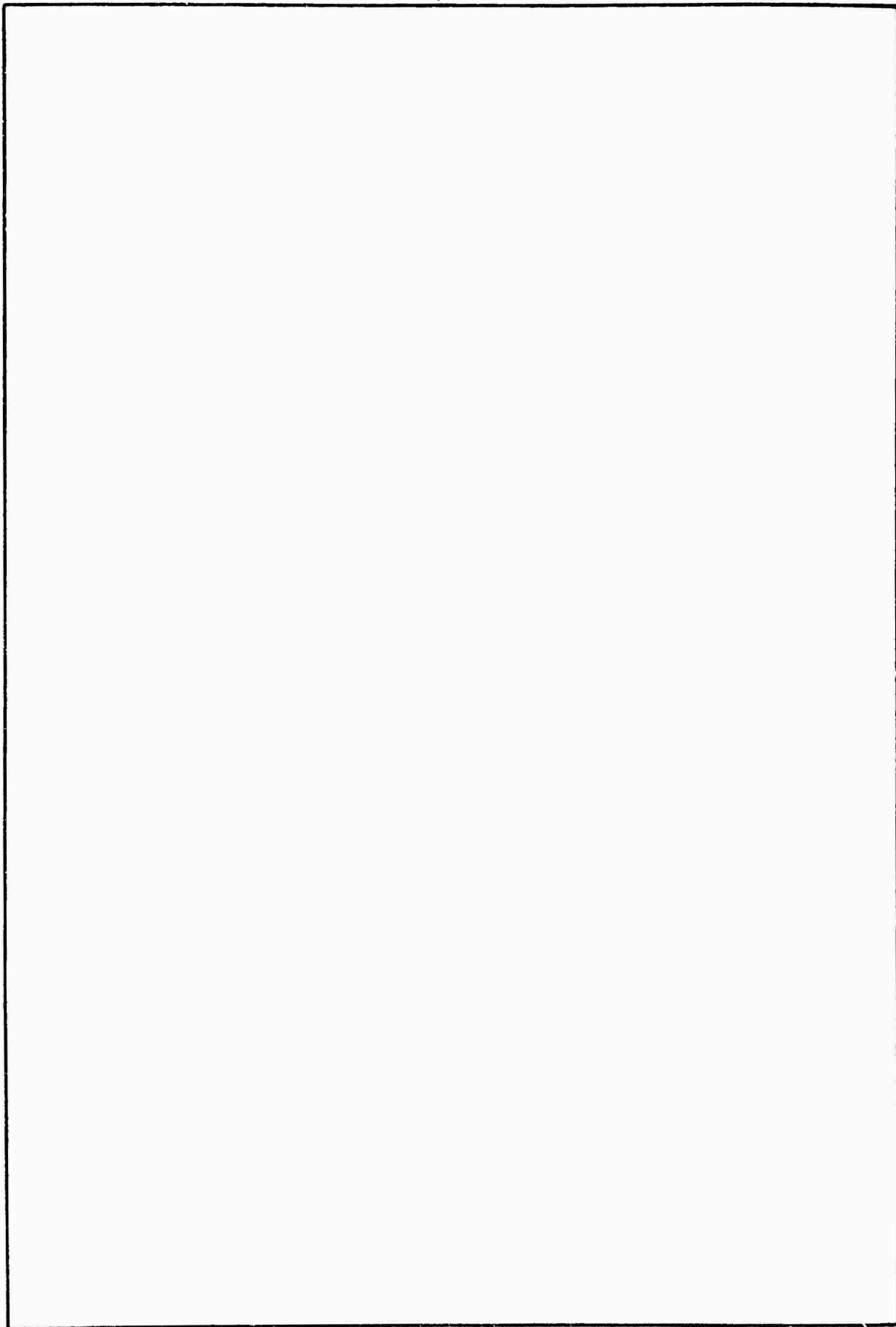
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Submitted by

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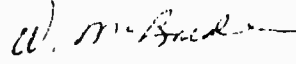
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1. The procedures herein described were developed as part of the wax evaluation program under the direction of Navy Ships Parts Control Center, Mechanicsburg, Pennsylvania Project Order No. N0010473EA665 Amendment Two of 4 March 1972.

RANDALL W. YOUNG
Captain, USN
Commanding Officer


W. McBRIDE
By direction

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TEST PROCEDURES FOR
QUALIFYING WAXES
FOR USE IN EXPLOSIVES

I. INTRODUCTION

A wax furnished under MIL-W-20553 for use by the U. S. Navy in desensitizing explosives must be a product which has passed the applicable qualification tests herein and has been listed, or approved for listing, on the Qualified Products List.

This report outlines the procedure for qualification testing of each candidate desensitizing wax for determining whether or not it can be approved for listing on the Qualified Products List.

MIL-W-20553 specifies that the testing will include, but will not be limited to, the following: physical and chemical properties, pressability, incorporability, sensitivity, compatibility, flow properties of formulated explosives, and cast shrinkage.

II. PHYSICAL AND CHEMICAL PROPERTIES

Upon receipt of the qualification test sample of the candidate desensitizing wax, the wax will be evaluated for the physical and chemical properties specified in MIL-W-20553. If the wax is determined to be acceptable, it will be subjected to the tests outlined in Sections III, IV and V.

III. QUALIFICATION FOR USE IN COMPOSITION A-3 EXPLOSIVE

A sample of the candidate wax will be forwarded to Holston Army Ammunition Plant, Kingsport, Tennessee, to be used in manufacturing Composition A-3 explosive to meet the requirements of MIL-C-440. This explosive will be used to press load both the 5 inch 54 caliber and the 5 inch 38 caliber projectile configurations. Since both 6- and 8-increment loads have been developed for high and low density Composition A-3, respectively, both loads will be evaluated regardless of the bulk density of the candidate material.

A. Testing

The Composition A-3 explosive will be analyzed for compliance with the requirements of MIL-C-440.

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Thirty 5"/38 projectiles will be loaded, 15 with the 6-increment plan and 15 with the 8-increment plan, with explosive temperature at 68 degrees Fahrenheit (°F) in accordance with the procedure specified in OD 45001. Both plans will be repeated at a temperature of 80°F.

Thirty 5"/54 projectiles will be loaded, 15 with the 6-increment plan and 15 with the 8-increment plan, with explosive temperature at 68°F in accordance with the procedure specified in OD 45295. Both plans will be repeated at a temperature of 80°F.

The explosive overall and core densities will be determined as described in WS 13564 for the 5"/38 projectile and in WS 13574 for the 5"/54 projectile.

All fuze cavities will be drilled 5 inches deep with the diameter as specified for the particular projectile.

All projectiles will be radiographed after drilling and evaluated for cracking, separation and density variation.

The loaded projectiles will be shipped to the Naval Surface Weapons Center, Dahlgren Laboratory, for WR-50 28-day temperature-humidity cycling test between -65° and 160°F, with 95 percent relative humidity, to determine the explosive's ability to withstand cracking and exudation.

B. Acceptance

If the Composition A-3 explosive made with the candidate wax passes all of the above testing, by comparison to the performance of Composition A-3 using a previously qualified wax, the wax will be acceptable for listing on the Qualified Products List for use in Composition A-3 explosive for Navy use.

IV. QUALIFICATION FOR USE IN COMPOSITION B EXPLOSIVE

A sample of the candidate wax will be forwarded to Holston Army Ammunition Plant, Kingsport, Tennessee, to be used in manufacturing Grade A Composition B explosive to meet the requirements of MIL-C-401. This will be used in casting test containers for evaluating the explosive.

A. Testing

The Composition B explosive will be analyzed for compliance with the requirements of MIL-C-401 for Grade A.

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Explosive batches of Composition B will be prepared with an analysis of the top, middle and bottom samples of the batches for composition, uniformity and impact sensitivity.

A wax evaluation container will be loaded from each batch which will be shipped to the Naval Surface Weapons Center, Dahlgren Laboratory, for WR-50 28-day temperature-humidity cycling test between -65° and 160°F, with 95 percent relative humidity.

A "segregation test cylinder" will be poured from each batch and held at the pouring temperature for one hour for settling behaviour.

The explosive surface of the wax containers will be visually, photographically and radiographically inspected before and after temperature cycling.

The wax evaluation containers will be examined for the presence, degree, and identification of any exudate developed during temperature cycling.

The explosive in the temperature cycled wax evaluation containers will be core drilled and analyzed for composition and impact sensitivity.

B. Acceptance

If the Composition B explosive made with the candidate wax passes all of the above testing, by comparison to the performance of Composition B using a previously qualified wax, the wax will be acceptable for listing on the Qualified Products List for use in Composition B explosive for Navy use.

V. QUALIFICATION FOR USE IN COMPOSITION D-2

A sample of the candidate wax will be used in manufacturing Composition D-2 to meet the requirements of MIL-C-18164. This Composition D-2 will be used in formulating Grade A H-6 explosive to meet the requirements of MIL-E-22267.

A. Testing

The Composition D-2 will be analyzed for compliance with the requirements of MIL-C-18164.

H-6 explosive batches will be prepared with an analysis of the top, middle and bottom samples of the batches for composition, uniformity and impact sensitivity.

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A wax evaluation container will be loaded from each batch which will be shipped to the Naval Surface Weapons Center, Dahlgren Laboratory, for WR-50 28-day temperature-humidity cycling test between -65° and 160°F, with 95 percent relative humidity.

A "segregation test cylinder" will be poured from each batch of H-6 explosive and held at the pouring temperature for one hour for settling behaviour.

The explosive surface of the wax containers will be visually, photographically and radiographically inspected before and after temperature cycling.

The wax evaluation containers will be examined for the presence, degree, and identification of any exudate developed during temperature cycling.

The explosive in the temperature cycled wax evaluation containers will be core drilled and analyzed for composition and impact sensitivity.

B. Acceptance

If the Composition D-2 and H-6 explosive made with the candidate wax passes all of the above testing, by comparison to the performance of Composition D-2 and H-6 using a previously qualified wax, the wax will be acceptable for listing on the Qualified Products List for use in Composition D-2 for Navy use.

VI. SUMMARY

The purpose of the qualification testing is to verify that incorporation of the candidate wax in the various compositions will not alter large scale processing characteristics of the composition under test.